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(OFFICE OF STRATEGIC SERVICES)

Research and Analysis Branch

R & A No. 1565.1

("USE OF RADIO RECEIVERS BY RESISTANCE GROUPS IN EUROPE".)

Description

Present distribution, quantity and types of radio receivers in occupied Lurope, with tentative estimates on the feasibility of providing resistance groups in Europe with dry or wet cell battery radios.

December 4, 1943

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Office of War Information
Bureau of Overseas Intelligence

December 4, 1943

USE OF RADIO RECEIVERS BY RESISTANCE GROUPS IN EUROPE

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DENMARK

Present Situation

1. Distribution, quantity, types of sets

Up to the crisis of last August the Danish radio was remarkably free from German interference. The situation has changed somewhat, however, so that radio broadcasts now come under some form of censorship; but otherwise there are no restrictions, either upon radio ownership or on listening to foreign programs. The necessity for concealment has not yet arisen, and there has been no tampering with the power supply, except, in a few instances, by the saboteurs.

a. Number of radio sets

The number of licensed radio sets last September was 976,400. It has been estimated that at present it is well over 1,000,000.

b. Type of electric power

All rural areas have AC 50 cycles 220/380 v. This type is also standard in some of the towns having a population of 4 thousand or over but there are a number of exceptions as below:

The following towns, which use AC 220/380 volts, also use other types of supply as stated:

Copenhagen	DC 220/240 and AC 127/220
Fredericia	DC 110/440
Frederiksberg	DC 220/440 and AC 127/220
Haderslev	DC 110/220
Hjorring	DC 110/220
Kolding	DC 110/220 and 220/440
Nakslov	DC 220/440
Nykøbing (Falster)	DC 110/220
Odense	DC 220/440 and AC 120/208
Slagelse	DC 110/220

The following towns do not use AC 220/380 volts at all, and their supplies are as given below:

Aalborg	DC 220/240
Aarhus	DC 220/440
Assens	AC 110/190
Bronderslev	DC 220/440
Esbjerg	DC 220/440
Faaborg	DC 110/220
Frederikshavn	DC 150/300
Helsingor (Elsinore)	DC 220/440
Herning	DC 220/440
Hillerod	DC 220/440
Hobre	DC 220/440
Holbaek	DC 220/440
Holstebro	DC 110/220
Kalundborg	DC 220/440
Korsor	DC 220/440
Koge	DC 220/440
Lemvig	DC 220/440
Maribo	DC 110/220
Middelfart	DC 220/440 and AC 127/220
Nyborg	DC 220/440
Nykobing (Mors)	DC 220/440
Naestved	DC 110/220
Norresundby	DC 220/440
Randers	DC 220/440
Ribe	DC 200
Ringkjobing	DC 220/440
Ringsted	DC 110/220
Roskilde	DC 220/440
Rudkobing	AC 110/220
Ronne	DC 220/440
Silkeborg	DC 220/440
Skagen	DC 220/440
Skive	" " "
Soro	" " "
Struer	" " "
Svendborg	" " "
Sonderborg	" " "
Thisted	" " "
Tonder	" " "
Vade	" " "
Vejle	" " "
Viborg	" " "
Vordingborg	" " "

Towns of over 4,000 population not mentioned in the lists given are supplied with AC 220/380 volts only.

Recommendations

The resistance groups in Denmark fall into two classes: "the disciplined underground," and the "undisciplined underground." Under no circumstances should the "undisciplined underground" be provided with radio receivers. For these loose groups have a tendency to become confused, and to embark upon enterprises which may expose the civil population to merciless retaliation, and hinder rather than help the operations on "D-day."

The "disciplined underground" is well organized, and will know what to do in any contingency without directives from the outside. The local units, sometimes referred to as the "cells", are tied together, more or less closely, in a national organization. The best plan perhaps would be to provide each cell with a radio receiver. What type of sets should be provided is a question involving problems that must be solved by the technicians.

The distribution of the German forces will tend to limit the localities where the underground "cells" may be free to operate. The Western parts of Jutland are closely watched, and so also the traffic centers, and the sea approaches to the various parts of the Kingdom. The saboteurs have been most successful in the larger towns. Perhaps that fact will suggest the locale where contact should be made with the resistance groups.

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NORWAY

1. Distribution, quantity, types of sets (pre-invasion data).

a. The distribution of receiving sets increased three-fold or more from 1935 to the outbreak of the war. By December 31, 1939, there were in the country something like 421,000 licensed sets.

b. Type of electric power in Norway:

The standard type generally in use is AC 3 ph., 50 cycles, 220 volts. 3 ph., 50 cycle, 220/130 volts are used in a few places. Many small rural districts use 3 ph. 50 cycle, 220 volts. There is some DC current at 220 volts.

Battery sets were not common though they were used quite a bit in the northern part of the country. These sets were said to operate between 120 and 200 meters. The batteries to run them, B-batteries, ran at voltages 90, 120 and 150, plus the usual 1.5 - volt dry cells and 2 - volt air cells (this technical data is from the World Radio Market 1939). There were also some wind generators in operation.

Present Situation

In the autumn of 1941 the German authorities ordered a wholesale confiscation of radios in Norway. Only German and Quisling party leaders were allowed to keep sets. The number left in use was supposedly small, the figures commonly cited as being 7000 - 9000 sets.

The actual number left in use was undoubtedly quite a bit higher. The home front managed to salvage some for its purposes, a few car radios continued to operate, and some sets were brought in across the Swedish border. Hence there are good reasons for believing the number of sets operating at present is: considerably over 9000.

Recommendations

2. Estimated quantities of each type of set needed

We have no adequate basis for such an estimate. A loose guess, based on the number of herreder (townships), with rough adjustment for desolate and mountainous areas and for urban concentrations of population, suggests 500 sets.

This figure is a layman's guess pure and simple. It would be most unwise for any agency to earmark any such figure for Norway before the agency checked with the Norwegian Government in London or with circles which could sound out leaders of the Norwegian Home Front. Such leaders might prefer to have no additional radios brought into the country under present circumstances.

3. Purposes for which sets might be used.

Conceivably such sets might be useful in helping underground leaders to keep in touch with one another, especially in the mountainous fjord country.

4. How best can sets be gotten into the area?

We are not in a position to answer this question. SO or SOE through their London representatives may give some idea of this, if they are presented with a concrete proposal.

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FINLAND

Present Situation

1. Distribution, quantity, types of sets

a. The distribution of receiving sets has been increasing rapidly of late. If the rate of increase has been maintained since midsummer of 1943 the number of receiving sets in the country must now be around 475,000.

World Radio Markets in 1939 says that battery sets made up a large part of the total. It is likely, however, that socket power sets have been gaining in relative importance. There are a few wind generators.

b. The standard type of power is 3 ph., 220/380, tp cycle, AC. There are also some areas with 3 ph., 127/220, 50 cycle, AC, and a few with 120/208 or 110/190, 50 cycle, 3 ph. AC. DC 2 x 120 and DC 2 x 220 occur in at least one area each.

Recommendations

2. Estimated quantities of each type of set needed

An estimate seems superfluous here.

3. and 4.

No basis for any comment or recommendation.

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LITHUANIA

1. Distribution, quantity, types of sets (pre-invasion data).

a. Number and types of sets

In 1939 there were 77,562 radio sets in the country, not including Memel or Vilna. By May 1, 1940, there were 82,277 licensed radio sets in the country. Of these, approximately 17,000 were in Kaunas and 14,000 in Vilna; 23% were owned by farmers, 19% by professional people, and 15% by government and municipal officials. In 1939 of the sets in use, 17% were crystal sets, 29% were battery operated and 44% were socket power types.

b. Type of power

Almost 76% of the power supplied to consumers is of the AC type. The AC 50 cycle 3 phase of 220/380 volts predominates in cities while DC 220/440 volts is most common in rural areas.

Present Situation

All radio facilities were taken over by the Nazis immediately after the occupation of the Baltic States. Strict censorship of broadcasts was effected and rigid controls on listening were put into force. No up to date information on facilities is available.

Recommendations

2, 3, and 4. No basis for an estimate.

The only recommendation that might be made relates to use of languages in broadcasting to these countries. Besides the native languages, Russian can be used extensively, especially to Latvia and Lithuania, with a limited use of English and German.

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ESTONIA

1. Distribution, quantity, types of sets (pre-invasion data).

a. Number and types of sets

In Estonia in 1939 there were 74,720 radio receiving sets; of these 54,980 were in cities and 19,740 in the countryside. In 1938, about 30% of the sets were battery operated, while the balance were socket power sets. Most of the batteries were of the 2 volt storage type. The wave lengths required in Estonia were from 200 to 600 and from 1,000 to 2,000 meters, latest regulations providing that only one wire antenna be used.

Approximately 85% of the total output of electrical energy in Estonia is the AC 3 phase 50 cycles type. The secondary distribution of this type of current is usually made at 220/330 volts.

Present Situation

All radio facilities were taken over by the Nazis immediately after the occupation of the Baltic States. Strict censorship of broadcasts was effected and rigid controls on listening were put into force. No up to date information on facilities is available.

Recommendations

2, 3, and 4. No basis for an estimate.

The only recommendation that might be made relates to use of languages in broadcasting to these countries. Besides the native languages, Russian can be used extensively, especially to Latvia and Lithuania, with a limited use of English and German.

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LATVIA

1. Distribution, quantity, types of sets (pre-invasion data).

a. Number and types of sets

In Latvia in 1939 there were 140,000 radios of which about one-third were in rural areas. By 1940 this number had increased to 150,700. These sets, 80% of which had from 2 to 4 tubes, were all equipped for short wave reception. There were few battery or portable sets.

b. Type of power used

Almost all of these radios used 120 volt 50 cycle AC. There were some 220 volt circuits too.

Present Situation

All radio facilities were taken over by the Nazis immediately after the occupation of the Baltic States. Strict censorship of broadcasts was effected and rigid controls on listening were put into force. No up to date information on facilities is available.

Recommendations

2, 3, and 4. No basis for an estimate

The only recommendation that might be made relates to use of languages in broadcasting to these countries. Besides the native languages, Russian can be used extensively, especially to Latvia and Lithuania, with a limited use of English and German.

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GERMANY

Present Situation

1. Distribution, quantity, types of sets.

a. According to World Radio Markets 1939, 16,000,000 sets are in use in Germany, about 177 per thousand population. Out of a total unit production during the five years 1935-39, of 9,556,001 receivers, the following special types were produced.

Battery sets	174,533
Portable sets	73,742
Automobile sets	28,101

It is not clear whether the figures for battery sets and the figures for portable sets are mutually exclusive.

Nearly all regular receivers are wired for AC and in recent years the general trustee for the radio industry has forced manufacturers to limit production of other types.

These figures apply to the Old Reich only.

b. Electric Power

Germany has a multitude of consumer current characteristics which can be reduced in number only gradually to permit adoption of standard specifications. 3 ph. 50 cycle AC with 220/380 volts was gradually being introduced. The Reichsverband der Elektrizitaets-Versorgung compiled 1939 data on all cities of 100,000 and over. Of the 49 cities of this size, only 6 had no standard supply. Most cities of this size have at least 3 voltage systems. Latest complete statistics for Germany were published by the Reichsverband in 1934. The 1939 data are reproduced in U.S.D.C., (BFDC, Electrical Division), WORLD ELECTRICAL MARKETS, February 1940, Part III.

The turning off of electric power to interfere with listening to enemy broadcasts is not likely to be effective at all in the highly industrialized, urban areas of Germany proper. Such an action would interfere too greatly with the normal processes of industrial production.

c. Confiscation

As far as we know, there has been no confiscation of radio sets in Germany.

Austria

In Austria, according to World Radio Markets, 1937 (a very old source) there were about 596,000 licensed sets at the end of 1936, plus an estimated 50,000 unlicensed. Largest number are 4-tube, loudspeaker sets.

Prevailing current is 220 volt AC, various frequencies; but there are many exceptions.

Very few automobile radios.

Although battery sets are still used in various non-electrified areas, the number is diminishing as electrification is extended. Wind-operated generators not used; not enough battery sets to justify producing or importing them.

Recommendations:

The situation in Germany proper differs, of course, from all other countries treated in this report. Information about German resistance is still far from adequate. A report on this subject has been completed by the Central European Section. It is not yet cleared for distribution, but is available to MO for reference whenever desired. Apparently none of these resistance movements has connections with Western Europe. In general their organization for effective action is blocked by the extremely tight control exercised by the structure of the Nazi party, and their growth is made extremely difficult by the deliberate atomization of society into groups so small that no one bloc is able to act effectively as such. In addition, to date all reports concur in emphasizing that few agents of any kind have been able to get into Germany. We have consulted with a very well-informed member of SI, who concurs with us in the opinion that under the present circumstances it would be highly unwise to attempt to plant radios of any kind inside Germany. The chief reasons upon which we base our conclusion are these: (1) It would be next to impossible to get sets into Germany because of the lack of any organized channels of entry, and the absence of "reception committees" in Germany itself to route the sets into the proper hands. (2) The danger of sets falling into the hands of the Nazis, or of their exposing to the authorities what resistance groups there are is too great to warrant the attempt. (3) Should sets be gotten into the country, the extremely tight control exercised over every part of Germany would make the operation of such sets too dangerous. Of course with a deterioration of the situation within Germany in the near future these conditions might change.

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Although Austria is under the same strict control as Germany proper, it should be considered somewhat apart for the following reasons: (1) Because of the average Austrian's sense of his country as a separate national entity, there would probably be more individuals in Austria than there would be in Germany proper who would be willing to take risks of the kind involved in the present project in order to further the cause of eventual Austrian independence. (2) Despite direct German control, Austria has a long and mountainous border with Switzerland which would mean that the parachuting or smuggling of sets into this rural, predominatly Catholic region might be possible, although the value of sets in such an isolated region might be open to question. Similarily, recent OSS reports emphasize that communication between Jugoslavia and Austria is entirely feasible, hence the possibility of agents entering the country from this direction is good. Radio sets might therefore be smuggled or parachuted into the country from Jugoslavia. (3) Since it borders on Hungary, which is still a relatively free country in respect to social controls, much more information as to what is going on in the outside world leaks into Austria than into Germany, hence the Austrian would be more open to outside influence and control via radio if sets were made available. (4) The average Austrian worker has had more experience than the corresponding social-democratic German worker in underground movements and in underground resistance, both during and before the war.

For these reasons the projected plan might have a measure of success in Austria where it would not in Germany. However, we are not in a position to recommend ways and means of getting sets into the country.

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POLAND

Present Situation

1. Distribution, quantity, types of sets

(1) Receiving sets. According to World Radio Markets, 1939, there were 1,070,165 sets in use. Of this number, 695,647 were tube sets. Digesting the statistics in the NRU, it seems probable that there are about 80,000 battery sets in Poland.

(2) Electrical power. AC 3 ph. at 50 cycles predominates in the larger cities. Many of the smaller plants produce only DC. Voltages are not standardized, but 220/380 v, 127/220 v and 110/220 v are most common. Details may be found in: U.S. Department of Commerce (Bureau of Foreign and Domestic Commerce), World Electrical Markets, Poland, No. 119, May, 1939.

(3) Confiscation. Confiscation of battery sets is not considered important, since only 8% of the pre-war total were battery sets, by estimate.

Recommendations

immediate or pressing

There seems to be no need for additional radio sets of any type in Poland. Clandestine listening and wide dissemination of news is already highly developed in the country. ~~The following is a quotation from~~ EFC European Audience Estimates, Series 5, No. 3, 4 Aug. 1943, supplied some of the following data:

"Listening to foreign radio--and particularly the BBC--is the main source of external information for the illegal newspapers. There are organized groups of professional listeners, monitoring British and also American, Russian and neutral broadcasts. Reports of April, 1943, claim the existence of about 350 listening-posts with a personnel of 1500 monitors. Apart from the professional listening groups, there is an audience comprising:

(a) some of the Volksdeutsche who, despite being put on the Volksliste (being thus enabled legally to obtain a radio set), remain in fact loyal Polish citizens

(b) Poles listening on sets owned by Germans

(c) Poles listening on their own hidden sets

(d) workers who have occasional opportunities for using ship radio sets in ports

(e) Ukrainians and foreigners.

"However, the main source for distribution of news remains professional monitors and editors of clandestine news sheets. Most underground newspapers are information bulletins, containing the latest news from abroad, gathered by special radio listeners. Many publications are controlled by the Plenipotentiary of the Government-in-Exile and print his appeals and directives. Other papers are published by the major political parties and discuss problems of Poland's political future. There is a certain number of satirical newspapers, fighting the Germans with the deadly weapon of laughter.

"The organized groups use powerful receivers with short-wave facilities. The need for replacement of used spare parts does not seem to affect listening activity. This can be explained by the fact that a German factory of radio parts in Warsaw has been losing material at the rate of RM 5000 per month. Over 2000 radio tubes were purloined during one month alone and 40 loud-speakers were missing from stock. (Cf. Litzmanstaedter Zeitung, 2 Jan 1942.)

"Poles are not allowed to have radio sets, and listening to foreign broadcasts is forbidden for everyone. The Poles have developed many methods of evading detection. Guards are posted to warn of approaching danger, loudspeakers are run very softly, sets are switched back to German stations, etc. It is often necessary to dismantle and remove sets after each listening. Cases have been reported of sets being hidden and operated inside bakery ovens."

The radio situation in Poland seems to be very good; and the Polish Underground has not made any requests or complaints. Since the Poles themselves have refrained from asking for outside aid in expanding their listening facilities, it seems safe to assume that their equipment and organization suffice for present circumstances. There would, however, be considerable benefit in the distribution of additional battery sets. For one thing, any crisis (especially D-Day) would surely be accompanied by a disruption of power facilities--battery sets thus become extremely valuable for the maintenance of contact among resistance groups. Even at present, battery sets might be welcome; for current is not always available and is rigidly controlled, and the Germans have special devices for detecting the theft of current. Also, listening posts are usually in the villages, which do not often have current.

Political Situation. In general the Polish resistance groups are divided into those controlled by Russia and those controlled by the Polish Government-in-Exile in London. In the latter there is a special section of the Polish General Staff which has thoroughly organized all contacts with the Government underground in Poland. Any dissemination of additional radio sets should be carried out in consultation with this unit. Both for reasons of economy of operation, and because the Poles are apt to be very resentful of any interference in their affairs from the outside, it is important that the program be carried out through approved channels.

The Russian-oriented underground, on the other hand, seems to be well supplied with all facilities by the USSR. In addition, since the Russians consider the Eastern part of Poland as an integral part of the USSR, it would of course be unwise to interfere with this territory in any way, or to open contacts with the Russian-dominated underground.

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CZECHOSLOVAKIA

Present Situation

1. Distribution, quantity, types of sets.

In the Protectorate there are about one million licensed sets (912,000 in August, 1941), of which one-third to one-half are in or near the city of Prague.

About 961,000 receiving sets at end of February, 1937. 15% crystal sets, 10% battery, 75% socket power.

3- and 4-tube sets most popular; types produced locally are usually adaptable to 120 and 220 volts, 50 cycles; the latter is the prevailing voltage in the country.

Very few auto radios.

Very few battery sets; battery service stations accessible and charging cost low, hence no wind chargers are produced or imported. As the country is thoroughly electrified, no great peacetime demand for battery sets.

Sets plug in with Edison screw sockets and round-pin extension plugs. European-type tubes are used; American tubes will not fit their sets.

Short-wave receivers have been sequestered and the short-wave parts of wide-range sets removed; however, this was not done until the spring of 1943, so it is very likely that many have been successfully concealed. The Czechs doubtless use a variety of tricks, including turning in old sets and hiding the better ones. They are also said to have small detachable coils which can be plugged into regular sets for short-wave reception. The relatively high proportion of skilled workers still at home (few have gone to Germany and none have been drafted for the army) makes repair and maintenance much easier than in most of Axis Europe.

In the Sudetenland there are, by rough estimate, between 150,000 and 200,000 sets.

In Slovakia there were 132,000 licensed sets in September, 1943; and there are probably more now; for August alone showed an increase of 1900. Short-wave receivers have not been removed here, and the regulations against listening to enemy broadcasts are openly flouted. Most of the sets are probably in Bratislava and a few other cities. Battery sets might be found in the rural areas, although no definite information is available. Since police control is lax and since word-of-mouth communications are active, Slovakia would probably need very few extra sets.

Recommendations

2. Estimated quantities of each type of set needed.

We would recommend that no large number of sets be supplied to Czechoslovakia; first, because the inhabitants are already pretty well supplied; second, because of the risk of endangering the underground by premature action (especially in the Protectorate and Sudetenland); third, because of the political conflicts in Slovakia and the Sudetenland, where there are some rival resistance movements opposed to the government-in-exile.

3. Purposes for which sets might be used.

Sets might be used for conveying orders to resistance groups on D-Day and for directing rumor-spreading activities. There is a supplementary service possible through the public-address systems, which exist in most of the larger cities in the Protectorate and Sudetenland and in a few Slovak cities. If patriots succeed in capturing radio stations early in the game, they could often supplant the individual sets.

4. How best can sets be gotten into the area?

Direct contacts with the Protectorate and Sudetenland would be difficult, because there the Gestapo control is extremely strict. Much the easier route would be through Slovakia, where regulation is lax and officials more easily corruptible.

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HUNGARY

Present Situation

1. Distribution, quantity, types of sets.

According to World Radio Markets 1939, 419,215 sets are in use. 15% of them are battery sets. Nearly all sets are of domestic manufacture. Edison screw terminals and pin plugs are used.

The electric power situation is as follows: AC at 110 volts, 105 volts, and 100 volts is frequent, usually supplied at 42 cycles but sometimes at 50 cycles. A little AC is supplied at 220 and 120 volts. Some DC at 220 and 120 volts. Some DC at 220 (most common), 110, and 120 volts will be found.

Confiscation not considered important in the case of battery sets, since the latter formed such a small proportion of pre-war total.

Recommendations

As the situation is at present, we would not recommend supplying radio sets to Hungary for the following reasons: (1) There is no underground movement in Hungary, and the parliamentary opposition still functions without restrictions. (2) There is no restriction on listening to foreign broadcasts in private homes, and it is generally understood that everyone listens to the foreign short-wave programs. As an indication of the social freedom at present existent in Hungary we might point to the fact that the fastest selling book in Hungary today is the translation of Willkie's "One World". It is obvious that without resistant groups, and with a large measure of freedom, Hungary needs no radio sets for the purposes indicated.

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ITALY

Present Situation

1. Distribution, quantity, types of sets

(1) Quantity. As of December, 1941 there were 1,578,199 licensed radio receiving sets in Italy (including Sicily and Sardinia). An unofficial estimate of the same date gave a total of 1,674,546 radio receivers (36 per 1,000 inhabitants). The ratio of listeners to sets has been estimated as high as 6 to 1, making a total of perhaps 10,000,000 regular listeners. Confiscation of private radio receivers in German-occupied Italy is believed to have begun during November 1943.

(2) Distribution. A considerable number of licensed sets are used for communal and institutional listening. In 1939-40 radios were located in 6400 Dopolavoro clubs, over 20,000 schools, and over 23,000 public establishments (bars, restaurants, railroad stations, factories, Fascist organizations, etc.); there were also communal receivers in every village.

The following figures show the number of licensed receivers (as of December 31, 1941) in each Italian compartimento now under enemy control:

Abruzzi e Molise	22,052
Emilia	123,071
Lazio	162,416
Liguria	95,798
Lombardia	314,584
Marche	28,562
Piemonte	202,322
Toscana	114,877
Umbria	19,736
Veneto	115,060
Venezia Giulia e Zara	53,790
Venezia Tridentina	27,677
	1,279,945

Following are the numbers of receivers (as of December 31, 1940) in important communes (cities) now under enemy control:

Ancona	5,158	Milan	140,315
Bologna	25,421	Rome	111,726
Bolzano	4,986	Turin	81,317
Florence	28,714	Trieste	24,129
Genoa	51,473	Venice	19,330
L'Aquila	1,517	Verona	8,538

(see also appended distribution map supplied by Europe-Africa Topographic Intelligence Sub-division).

(3) Types of Sets. Almost all sets use house current; battery sets are extremely rare. The normal house voltages are AC 127v. and AC 150v. (occasionally 110-130v. and 140-160v.). Edison screw and round pin terminals are used.

About 25 percent of all sets are believed equipped to receive short wave (as of 1943). Italian medium wave broadcasting stations use frequencies between 1429 and 556 Kc/s.

It is believed that no new civilian sets have been manufactured since August 1943. A shortage of tubes has been reported, but spare parts have been obtainable on the black market. It is understood that repairs have been available.

The dependence of most radio receivers on public power supply will probably be a serious obstacle to radio reception during a period of military operations, as the Germans are likely to wreck all power installations before evacuating a given area.

Recommendations

2. Estimated quantities of each type of set needed

It is thought that even three or four sets in each province, in the proper hands, would do a great deal of good. (This estimate takes into account the rather high development of word of mouth communication in the Italian underground.)

Assuming that all Italy north of Rome (59 provinces) is to be supplied, this would make 177 sets. For the Po Valley and the area to the north (44 provinces), only 132 sets would be required by this calculation. Additional sets might be useful if the difficulties of getting them in were not too great.

Let battery sets would be appropriate in regions where there is widespread electrification, but might prove useless in sparsely populated areas without charging facilities. In general, we would not advise storage battery sets for the 16 provinces north of Rome having a population density of 100 per square kilometer or less (Aosta, Cuneo, Sondrio, Bolzano, Trento, Belluno, Udine, Carnaro, Gorizia, Istria, Arezzo, Grosseto, Perugia, Terni, Rieti, Viterbo). Many of these are mountainous provinces where guerilla activity has already been reported.

3. Purposes for which sets might be used.

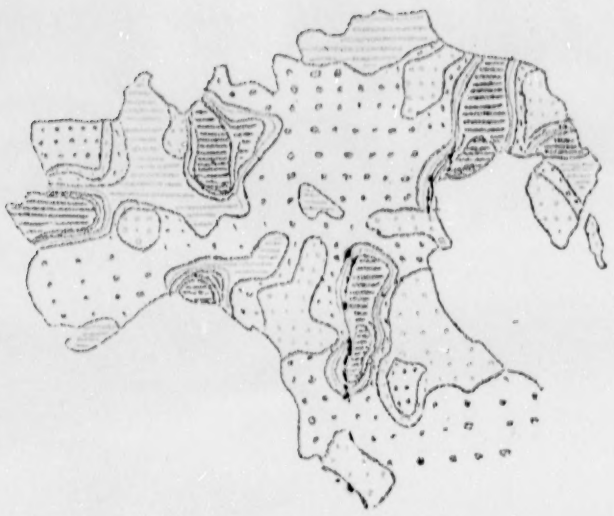
There seems to be no reason why they could not be used for all the purposes suggested in the outline of the project.

The Most rewarding results would probably be obtained from distributing sets to (a) the active resistance groups in the large cities, and (b) the guerrilla forces in the northern mountains.

4. How best can sets be gotten into the area?

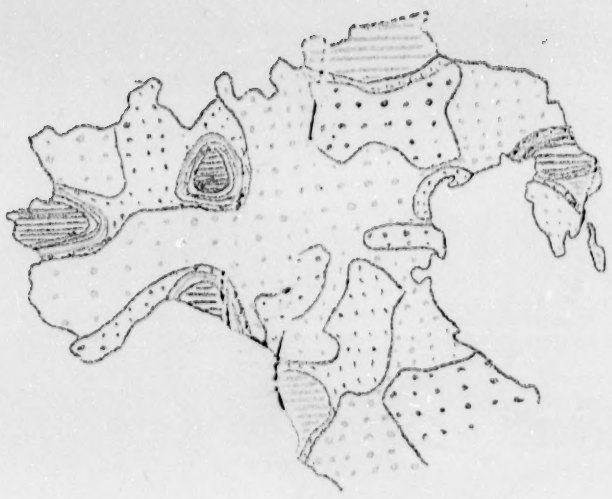
The only methods which seem to be available are (a) delivery by parachute and distribution by underground agents, and (b) smuggling by fishing-boats. The latter method is considered rather unpromising in view of the small number of boats available and the importance of the other tasks to which they are assigned.

N.B. It appears that SI already has agents with several Italian resistance groups. These agents are equipped with two-way battery radios for communication with SI bases. The Italian desk of SI does not feel that the present project would interfere with or duplicate their work. It is suggested, however, that it might be desirable to adapt the new radios to receive SI transmissions as well as other broadcasts.



Telephones Connected With
Provincial Capitals
Number per 1000 Inhabitants
LEGEND

- less than ten
- from ten to twenty
- from twenty to thirty
- from thirty to forty
- from forty to fifty
- more than fifty



Number of Radio Receivers
per 1000 Inhabitants

LEGEND

- less than ten
- from ten to twenty
- from twenty to thirty
- from thirty to forty
- from forty to fifty
- more than fifty

SECRET

FRANCE

Present Situation

1. Distribution, quantity, types of sets.

(1) Electrical Power. For low tension supplies, AC 3 phase 50 cycles is practically universal. Voltages, however, are not standardized: 115/200 volts is most common, but 110/220 volts, 125/220 volts, 120/210 volts, 230/380 volts are also found. Southeastern France uses AC 25 cycles. Some DC is still in use, the supply being obtained by rectifying the alternating current.

The following two volumes, which may be obtained in the French library of CID, have detailed information for every town in France:

Camille Rousset, L'Annuaire de l'Electricité et de la T.S.F. et des Industries Electriques, 44 ed., Paris, 1937.

Electro, Annuaire de la Radiophonie et de l'Electricité, Paris, 1939.

(2) Receiving sets in use. About 5,219,661 sets are in use. Almost all [redacted] home receivers are socket power sets. Almost no automobile sets exist. Terminals are bayonet socket type, with two round pins 20 mm. long, 4 mm. in diameter and 19 mm. apart.

Confiscation has only just begun and has not been extensive.

Recommendations

2. Estimated quantity of each type of set needed.

The best advice indicates that both dry-cell and wet-cell battery receiving sets might profitably be placed in France. The former could be stock-piled in London and Algiers for distribution just prior to D-day; the bulk of them would probably better be kept in London because of deterioration in North Africa due to climactic conditions. The wet-cell sets could be sent in as soon as available. Six-volt batteries could be provided inside France and recharged in trucks or doctors' cars.

The number of sets which might be employed in France is undeterminable. At present no additional sets are needed for the purposes proposed. Should the current be disrupted at a crucial moment, no figure short of one-half the present number of non-battery receivers (over one million) would be too large.

Taking into account the problems of sets available, the current need (confiscation of radio receivers in France has only recently been instituted), and SO logistics, a reasonable total estimate of receiving sets required would be 5,000. Of these 1,000 should be wet-cell operated (of the Special Services set type) and 4,000 dry-cell operated (similar to the RCA BP-10).

3. Purposes for which sets might be used.

Since France has a large number of receiving sets (125 sets per 1,000 inhabitants), it might be well to use the receivers here proposed only as insurance against a current shut-off at the time of an Allied invasion. The most desirable areas where these sets could be located are the Paris region, the Massif Central, and Haute Savoie, all important centers of resistance activity.

4. How best can sets be gotten into the area?

The transportation of radio sets into France can be handled only by parachute. So far this has been undertaken exclusively by British SOE, but shortly American SO will also engage in such activities. SO, however, clears all of its projects with SOE, under a joint agreement, and both agencies work closely with the French Military.

SECRET

NETHERLANDS

Present Situation

1. Distribution, quantity, types of sets

(1) Electrical Power. The normal type of supply is three phases, 50 cycle, AC at 220/380 volts. There are numerous exceptions to this rule. The following areas form the most important exceptions:

The Hague	127/220 volts
Gouda	127/220 volts
Nymegen	125/216 volts
Veendam	150/260 volts
Venlo	120/208 volts
Dordrecht	125/216 volts

(2) Receiving sets in use. In May 1940 there were 1,086,513 receiving sets in use, a very few of which were battery sets. The radio distribution system whereby several loudspeakers are served by a single set with multiple extension wires was very extensively organized in the bigger centers.

On 28 May 1943 the German occupying authorities ordered the confiscation of all radio sets. It is known, however, that the order has not been carried out extensively. It is reliably reported that thus far only 60,000 sets have been turned in, but it can be expected that the Germans will intensify their confiscation drive.

There are a small number of battery operated sets on boats. The six volt auto battery is used for these sets. Edison screw and pin plug terminals are used.

Recommendations

2. Estimated quantity of each type of set needed.

On the basis of the expected intensified confiscation of radio sets, as well as possible disruption of the current, the number of battery receiving sets that can be used is equal to half the pre-war figure. The minimum number to maintain necessary contact with underground groups is to be estimated at 400; most of which should be dry-cell operated. The wet-cell sets could be sent in as soon as available; but it is

suggested that the dry-cell sets not be sent until the last moment because of bad climactic conditions in the Netherlands.

3. Purposes for which sets might be used.

The Netherlands underground groups are well organized and are more than likely controlled by a central administration. It would, therefore, be well worthwhile to distribute sets to the underground, but the minimum number of sets required would be smaller that that recommended for Belgium. Distribution is recommended particularly in the industrial areas of Twente, Amsterdam, Rotterdam, Tilburg, Eindhoven, and the southern part of ~~Luxembourg~~ LIMBURG, and in the centers of the Hague, Hilversum, etc.

4. How best can sets be gotten into the area?

The transportation of radio sets into the Netherlands can be handled only by parachute.

SECRET

BELGIUM -- LUXEMBOURG

Present Situation

1. Distribution, quantity, types of sets.

(1) Electrical Power. The characteristics of the current furnished in Belgium to the general public are as follows:

a. For light only: one phase wire and one neutral 110 and 130 volts, or two phase wires and one neutral 110 and 130 volts.

b. For light and power: Three phases 190 to 220 volts. In the country generally 220 volts between two phase wires. The current used in most instances is 50 cycle 220. Added together, the following currents are used in as many instances as the 50 cycle 220: 50 cycle 115, 50 cycle 127, 50 cycle 130, 50 cycle 135.

The tendency is to replace direct current with alternating current wherever possible, with the result that in the cities different types of current are found in the same street, even in two neighboring houses. A list of all Belgian cities and villages showing characteristics of electric current, prepared by the Department of Commerce Bureau of Foreign and Domestic Commerce, is available in the Western European Section of R & A.

Luxembourg has both 110 and 220 volt 50 cycle AC.

(2) Receiving sets in use. About 1,120,402 sets in use prior to the war; 602,000 at the end of 1942.

Battery receivers are rare. Auto batteries are six volts. The number of portable radios is unknown but is undoubtedly very small. Sockets for household electricity are of the Edison screw type. Attachment plugs (outlets) are of the pin type.

Confiscation of radio sets has not yet been ordered in Belgium, but it is to be expected that such an order might be promulgated at any time.

In Luxembourg there are 36,949 radio sets in use. There are almost no battery sets. Terminals are either Edison screw or pin type.

Recommendations

2. Estimated quantity of each type of set needed.

Both dry-cell and wet-cell battery receiving sets should be placed in Belgium. The wet-cell sets could be sent in as soon as the expected confiscation order is issued; but it is suggested that dry-cell sets be distributed at the latest possible moment. In a crisis, should the current be cut off, any number up to one-half of the present figure of battery radio sets could be used to replace non-battery sets. The minimum requirements, in order to maintain contact with underground groups, could be estimated at 600, the greater part of which should be dry-cell operated.

Luxembourg could use a minimum of 100 dry-cell operated sets.

3. Purposes for which sets might be used.

Belgium is one of the most densely populated areas in the world (272 persons per square kilometer). This factor facilitates spreading of news or rumors in a minimum period of time. However, the number of different and separate underground groups is high. An important purpose of the projected distribution might be to place in the hands of each separate group a receiving set, thus insuring co-ordination. The most active resistance groups are centered in the industrial areas of Antwerp, Liege, Charleroi, Mons, Verviers and the Campine mine districts. The areas of Brussels, Ghent, Dinant, Luxembourg are equally important.

4. How best can sets be gotten into the area?

The transportation of radio sets into Belgium and Luxembourg can be handled only by parachute.

SECRET

YUGOSLAVIA

Background and Present Situation

1. Distribution, quantity, types of sets

a. Pre-war

Since communications were a Government monopoly in Yugoslavia before the war, all radio purchases were required by regulations to be registered and the identity of purchasers had to be reported to the authorities. Registration of receiving sets as of April 30, 1940, totalled 168,730, but there were believed to be a considerable number of unlicensed sets. According to a classification of sets in use on January 1, 1940, of a total of 135,132, 45,386 sets were 3-tube and 41,966 4-tube. Sets of 2,5,6, and 7 tubes and crystal sets each accounted for small numbers. It is believed that of all the sets imported into Yugoslavia, between 15 and 20 percent were battery. Of socket power sets, 95 percent were AC and 5 percent DC. Automobile sets were popular, 10 to 15 percent of the cars in use were radio equipped. Registrations on January 1, 1940, showed 15,768 vehicles in use.

The following are the approximate ranges that were required in broadcast receivers: long wave, 725 to 2000 meters; medium wave, 185 to 580 meters; short wave 16 to 50 meters. Ultra-short or tropical waves were not in use. Statistics of short wave sets in use were never given.

b. Electricity supply

Alternating current of 220 volts, 50 cycles was most common. About 20 percent of the service was on 120 volts, 50 cycles AC. The centers of Sarajevo and Ljubljana were the only places where DC could be used. The pre-war supplies of batteries must long since have been exhausted. There were about 100 battery-charging generators sent from the United States for army purposes. All of them were gasoline driven. On account of the atmospheric conditions, wind driven generators could not be used effectively.

c. The Guerrillas

The guerrilla resistance is centered in the following areas: Istria and Slovenia, Northern Dalmatia, Central Dalmatia, Bosnia, Southern Dalmatia, Montenegro, Hercegovina, and Slaavonia and Srem. The Partisan Forces hold most of this area with 220,000 men, and the Mihailovich Chetniks hold the area in south east Montengro with 15-20,000 men. The communication system is very

inadequate in both camps. Mihailovich's equipment consists of five central portable sets with 35 weak, primitive and low powered home-made sets in the field, whose wave length permits only daytime operation. Both Mihailovich and the Partisans have been forced to use couriers in combat and elsewhere. The Partisans have captured from the Italians and Germans much of their radio equipment, which is also far from adequate for the needs of 26 divisions. What sets they do have are reported to be wet battery and maintained by excellent Italian mechanics who have joined the Partisan ranks since the capitulation. Recent Partisan successes in Dalmatia and Croatia may have enabled them to confiscate some sets owned by civilians, as there were as of February 1, 1943, in Zagreb 28,451 radio sets, in the province of Zagreb 36,637 sets, in Makarska 1,877 and in the Sarajevo district 8,416. Most of these of course would not suit their needs.

Restrictions

In Croatia and Serbia, all civilian wireless sets are required by law to be registered with the postal authorities. Short wave reception is sealed on all sets by officials, and if the seal is discovered to have been broken or removed the set is confiscated and the owner is sent to a concentration camp. Listening to Allied broadcasts has resulted in death penalties for some. Electric power supply has been limited, especially in the mountainous areas where the chief guerrilla forces are located. Batteries are the only solution and very much in demand. As there are gasoline driven motors and ample gasoline available, wet cell batteries are kept in good condition.

Recommendations

2. Estimated quantities of each type of set needed.

a. If 300 wet-battery sets of the Special Service type were sent to the Partisans it would aid them considerably.

b. On D-day, as many dry-cell sets of the BP-10 type as can be spared for this area should be sent.

3. Purposes for which sets might be used.

The sets would solve the present communication bottleneck and would speed up operations considerably. Instructions from the Allied command would be picked up at various headquarters in the

area on or before D-day. Troops would be informed of military events taking place outside the country as well as within the country. MO operations would be facilitated, and Partisan collaboration would be expedited. Both morale and efficiency would be raised.

4. How best can sets be gotten into the area?

The best method of getting the sets to the Partisans would be by boat from Italy to a Partisan held Dalmatian Island from which they could be smuggled inland. Fishing craft and other small boats could be used to make landing along the coast. There are many Dalmatian fisherman in Italy who know the coast and who could perform the task, providing that contact was made with the Partisans and signals were prepared. This should be done during the night as the enemy does not carry on operations after nightfall.

SECRET

GREECE

Present Situation

1. Quantity

In 1940 approximately 55,000 receiving sets of various types were said to be in use.

2. Electrical Power

Most sets are operated by house current, the official standard for which is AC 3 ph., 50 cycle, 127/220 volts. DC 220 volts is also extensively employed. In the Athens area many localities have 220/380 volts AC; many sections of the country served by very small plants have 110 volts DC. (For details see "Report on Greece, Electricity Supply," OSS, CID 39868 C.) Radio terminals are either Edison sockets or, more frequently, of the bayonet socket type (5/32" in diameter, 3/4" apart on the centers, and 11/16" long).

3. Types

With the beginning of the war radios depending on batteries (especially dry cell) became very popular. NO has already sent 220 radios (packed 11 in a box), which left the port of embarkation November 13, 1943. These radios, procured in New York through the Special Services Division, are for AC only (type SSD-2). It is expected that 280 more of the same type will be shipped to Cairo before very long. Because of the acute shortage of electrical power in Greece, however, too much reliance must not be placed upon sets of this kind. Many districts, even before the war, had no electric light. Moreover, in many sections of the country, the Germans have confiscated the diesel engines which had been used to generate electricity. Fuel oil is, of course, very scarce. Even in the two areas of the country which are most richly supplied with electric current (Athens and Salonica), household consumption is strictly limited (to 7 kwh per house per month, according to one report). Moreover, electricity can be used only at certain designated periods (usually in the evening). It follows, therefore, that so far as possible battery sets should be supplied. These sets should be able to cover all wave lengths.

4. Restrictions

The Germans are said to have been making strenuous efforts to round up all the receiving instruments in certain areas, especially in the rural districts. But is is reported that at least 3000 sets are in operation in Salonica and its environs, and 30,000 in Athens. Moreover, the Germans broadcast daily from the Athens Broadcasting Station (with studios in the Zappeion Building, the radio towers of the station apparently being located in Liosia, 5 kms. north of Athens). A report of November 1941 has it that the Germans had planned to increase the power of the station from 15 to 70 kw., but a source of August 1943 (described as "reliable") informs us that the Athens Radio is still no stronger than 15 kw. (supplied by high pressure current, 6000 volts) and operates at a wave length of 601 kcs. The FCC has overheard short wave broadcasts from both Athens (6326 kcs. and 8000 kcs.) and Salonica (6310 kcs.)

A certain number of powerful radio direction finders have been reported in Greece (on Mt. Parnes, on Cape Sunium, at Pallithea, on Mt. Hymettus, etc.). The three radio direction finder cars which are said to have been commissioned in Athens are allegedly engaged in hunting down receiver sets, but their real quarry may well be radio transmitting apparatus. This latter alternative is the more plausible in view of the fact that the Athens branch of the EAM is said to maintain contact with Kypsele (Thessaly) via wireless telegraph. EAM broadcasts early this year are said to have been responsible for the organization of successful demonstrations involving many thousands of people protesting against civil mobilization (February-March 1943). The underground communicates daily with Cairo by wireless telegraph.

The Germans are now equipped to jam the 31 metre wave length, one source says, and are ready also to provide interference in the 25 metr band, if BBC alters its wave length.

5. Distribution

Underground communications via the grapevine have already attained remarkable results. News in Greece spreads rapidly from village to village, and from block to block in

cities. A few hundred radio sets wisely distributed would vastly increase the efficiency and speed of news dissemination. Some of these sets should undoubtedly be allotted to the cities, but it is recommended that most of them be earmarked for small villages and towns. With a little care, it ought to be possible to plan a network of receiving centers that would cover the entire nation including the islands with a maximum of speed. The specific areas of distribution and the actual division into zones can best be determined in Cairo. If procurable, wet cells would be the more desirable, since they can easily be recharged. On the other hand, if, as seems probable, wet cell sets are not obtainable, dry cell battery sets are to be preferred to AC-DC sets.

Recommendations

6. Estimated quantities of each type of set needed.

We do not have access to sufficient factual information to justify any specific estimate.

7. Purposes for which sets might be used.

(a) Before D-Day. The Greeks are hungry for actual war news. They want to know what is going on in all theatres of the war. They appreciate fair and honest reporting of events. Our sources indicate that the Greeks are also anxious to hear of their own exploits and the atrocities they have suffered at the hands of the enemy, but are antipathetic to broadcasts by members of the Government-in-Exile. They like to be assured that the Axis and the Quislings will be made to pay for their crimes. They have been very much pleased by the BBC's use of a few bars of popular Greek folk music (shepherd's pipes, etc.) as a program signature, and would presumably appreciate the adoption of some similar Greek symbolism on American programs.

A background of straight, undoctored news, clearly and unambiguously reported, would form admirable cover for Allied PW and for MO rumors. Instructions to guerrillas and saboteurs could be quickly relayed in this way, although, of course, it should not be forgotten that the enemy monitors allied broadcasts.

(b) Immediately before, and on, D-day. It would naturally be of importance to inform the guerrillas of the hour and place of the Allied landings contemplated. Security could perhaps be insured by the use of code words or sentences. Allied landings, co-ordinated in this way with guerrilla operations, would be greatly facilitated.

6. How best can sets be gotten into the area?

(a) Methods

Radios and other supplies have been delivered to Greece during the war by parachute, submarine, and caique. There are wide areas in Greece, especially in Epirus and Thessaly, which are dominated by the guerrillas and almost completely free of Axis troops. In at least one of these areas, (known to SO), the Greeks have an air-field, which has been used to land both supplies and personnel. Some radios might well be shipped in this way.

(b) Distribution

The areas selected could of course be determined by OSS in Cairo, which is the custodian of the best and latest intelligence on such matters. But before any radios are sent out, care should be taken to secure the cooperation and approval of the chief political and guerrilla organizations. Because of the delicate political situation in Greece, it would be nothing short of disastrous to ship any kind of supplies to Greece without first consulting the principal factions. In the past both the EAM and the EDES have resented what they regarded as British favoritism in allocating materiel. With a little tact these difficulties can be obviated.

Representatives of the EAM, the EDES, and the EKKA, the leading underground organizations in Greece, should be consulted and be asked to approve whatever decision is made. The EAM official may prove to be a little difficult, but in the end he will undoubtedly listen to reason. In this connection, however, it is important to note the fact that the EAM is, by all accounts, the largest and strongest of the underground organizations and has a following throughout the country, while the EDES and EKKA, though powerful and important, are much more circumscribed in geographical extent.

SECRET

ALBANIA

Present Situation

1. Distribution, quantity, types of sets.

Information on radios in Albania is difficult to obtain. The following represents the best available: In 1939 there were about 3500 sets in use, most of them 5-8 tube receivers. The voltages for which transformers must be tapped: 125, 130, 150, 220, 240. 40 to 60 cycles. There were not many automobile radios. There has been only a small demand for battery sets, but it may have increased after 1938 because of the availability of wind chargers.

Information on electric power is conflicting. It is thought that only the following towns have electric powers, and that their current characteristics are as follows:

	Type	Phase	Cycle	Voltage
Gjinokastre (Argirocastro)	AC	3	50	125/220
Berat	AC	3	50	220
Durazzo (Durres)	AC	3	50	220/380
Elbasan	DC	-	--	125/150
Fier	AC	3	50	125/220
Kavaje	AC	3	50	125/220
Korca	AC	3	50	220 (also DC 220 volts)
Sarande (Porto Edda)	AC	3	50	125/220
Scutari	AC	3	50	125/220
Shijak	AC	3	50	125
Tirana	AC	3	50	220/380
Valona	AC	3	50	125/220

Recommendations

Since the Albanian resistance movement consists of small bands widely scattered, since the country is excessively primitive, and very few Albanians would know how to use a radio if they had it, since the resistance groups are divided into hostile groups, it seems inadvisable to send any sets at all to the country before D-day. Unlike the Yugoslav guerrilla army under Tito, the Albanians lack any cohesive military organization, and probably could not use radios to advantage for communications.

On D-day, a small number of battery sets might prove useful to the inhabitants of the coastal towns. These could be supplied by parachute or by Yugoslav sea contacts.

SECRET

RUMANIA

There are no reports whatsoever of any resistance groups in Rumania, hence distribution of radio sets in the country would fulfill no useful purpose.

BULGARIA

We know next to nothing about the resistance groups in Bulgaria, hence cannot take it upon ourselves to make any recommendations. Such resistance groups as there are really form an extension of the guerilla activity in Yugoslavia, and are centered in South Serbia and Macedonia, where they are cooperating with the Partisans of Yugoslavia. As such they should be treated together with the Partisans.